



Goddard Procedural Requirements (GPR)

DIRECTIVE NO.	<u>GPR 1700.5C</u>	APPROVED BY Signature:	<u>Original Signed By</u>
EFFECTIVE DATE:	<u>October 26, 2015</u>	NAME:	<u>Judith N. Bruner</u>
EXPIRATION DATE:	<u>October 26, 2020</u>	TITLE:	<u>Director, Safety and Mission Assurance</u>

COMPLIANCE IS MANDATORY

Responsible Office: Code 360 / Safety Division

Title: Control of Hazardous Energy (Lockout/Tagout)

PREFACE

P.1 PURPOSE

This directive identifies practice and procedure requirements designed to protect employees through Lockout/Tagout (LOTO) procedures. Specific definitions, practices, and procedures are outlined in Occupational Safety and Health Administration (OSHA) Standards under 29 CFR. 1910.147, “The Control of Hazardous Energy.”

P.2 APPLICABILITY

This directive applies to all civil servants and, to the extent provided in their contracts, contractors who perform hazardous-energy control operations at the Goddard Space Flight Center (GSFC), including Greenbelt, Wallops Flight Facility, and remote locations under GSFC control. This directive applies to all hazardous-energy control operations (both industrial and construction) such as, but not limited to, electrical, mechanical, hydraulic, pneumatic, chemical, and thermal sources. This directive applies to the control of energy during servicing and/or maintenance of machines and equipment.

P.3 AUTHORITIES

- 29 CFR Part 1910.147, The Control of Hazardous Energy (Lockout/Tagout), OSHA
- 29 CFR Part 1926.417, Locking and Tagging of Circuits

P.4 APPLICABLE DOCUMENTS

- NPR 8715.3, NASA General Safety Program Requirements
- GPR 1700.7, Electrical Safety

P.5 CANCELLATION

GPR 1700.5B, Control of Hazardous Energy (Lockout/Tagout)

P.6 SAFETY

Safety requirements as noted through this document.

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P.7 TRAINING

Authorized persons are required to attend a Lockout/Tagout Authorized Training Course developed by and specific to their organization and all associated on-the-job training (OJT)

Initial and refresher training shall:

- Include the course content requirements as defined by 29 CFR 1910.147(c)(7);
- Include other training classes as required by NPR 8715.3 7.3 and 7.4;
- Include a written examination to determine adequacy and retention of training;
- Be conducted periodically but not less than every 4 years or whenever there is a change in their job assignments, a change in machines, equipment or processes that present a new hazard, or when there is a change in the energy control procedures; and
- Be conducted whenever a periodic inspection reveals, or whenever the manager or supervisor has reason to believe, that there are deviations from or inadequacies in the authorized or affected employee's knowledge or use of these LOTO procedures. The retraining activity shall re-establish authorized or affected employee proficiency and introduce new or revised control methods and procedures as necessary.

Managers and/or supervisors shall maintain written or electronic documentation identifying current training records and requirements for each employee tasked to LOTO activities.

Affected employees and all other employees whose work operations are or may be in an area where energy control procedures may be utilized, shall be trained in the purpose and use of the energy control procedures and about the prohibition relating to attempts to restart or reenergize machines or equipment which are locked out or tagged out.

P.8 RECORDS

Record Title	Record Custodian	Retention
LOTO Authorized Training and Associated OJT	Office of Human Resources and Supervisors	<u>NRRS 3/33G1</u> Employees that have completed the training will be recorded in the SATERN Learning Management System. Destroy 5 years after employee discontinues or completes training
Emergency Removal of LOTO Device	LOTO Manager/Supervisor	<u>NRRS 1/117.5</u> . Handle as permanent pending retention approval.
Annual Review of the Control of Hazardous Energy Program.	LOTO Manager/Supervisor and Safety Office	<u>NRRS 1/125A</u> . Destroy when 10 years old or when superseded or obsolete, whichever comes first.
LOTO Outage Log.	LOTO Manager/Supervisor	<u>NRRS 1/117.5</u> .

*NRRS – NASA Records Retention Schedules ([NPR 1441.1](#))

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P.9 MEASUREMENT/VERIFICATION

- a. Periodic Hazardous Energy Control Programmatic Audits, noncompliance with OSHA or this GPR will be tracked to closure in the safety findings database; and
- b. Number of employees identified for LOTO training.

PROCEDURES

In this document, a requirement is identified by “shall,” a good practice by “should,” permission by “may” or “can,” expectation by “will,” and descriptive material by “is.”

1. ROLES AND RESPONSIBILITIES

1.1 Safety Division shall:

- a. Administer, maintain, and revise the LOTO requirements in this directive as needed;
- b. Evaluate/approve specific written procedures for (1) equipment that cannot be locked out; or (2) situations when a secondary means of isolation is not possible or deemed appropriate;
- c. Provide information and consultation as necessary to management and employees involved in LOTO operations;
- d. Review LOTO procedures for specific projects at the request of project managers or supervisors;
- e. Review periodically this directive and the effectiveness of the LOTO program as outlined herein;
- f. Coordinate with the Career Development and Employee Worklife Office Career Development and Training Group (Code 114) to make training in LOTO standards available to civil service staff;
- g. Provide contract and specification review as requested by project management and/or supervisors;
- h. Function as the regulatory liaison with outside agencies as needed for LOTO issues;
- i. Verify compliance with standards set forth in the program by periodic inspection of LOTO operations; and
- j. Suspend work where unsafe conditions are present.

1.2 LOTO-Authorized Managers and Supervisors shall:

- a. As applicable complete the Organizational LOTO Training Course;
- b. Ensure that identified LOTO-authorized employees complete the Organizational LOTO Training Course and initial OJT for all applicable LOTO procedures;
- c. Maintain records, including those identifying OJT of LOTO authorized employees;
- d. Upon the completion of training and authorization requirements, issue a certification that stipulates the specific equipment or types of equipment on which the authorized employee may perform LOTO operations;
- e. Provide additional OJT as needed to ensure that employees are thoroughly familiar with new or changed equipment and/or procedures;
- f. Maintain control of emergency keys for LOTO locks/devices;
- g. Remove LOTO locks/devices in the event of an emergency or assign to designee and document;
- h. Make available written equipment-specific procedures;

- i. Maintain records of LOTO outages; and
- j. Ensure an Energy Control Program and associated LOTO procedures are written and adhered to in accordance with the requirements defined in 29 CFR 1910.147.

1.3 LOTO-Authorized Employees shall:

- a. Complete the Organizational LOTO Training Course and initial OJT for all applicable LOTO procedures;
- b. Recognize the conditions of work requiring the utilization of LOTO procedures;
- c. Be able to determine and verify that isolation and de-energization methods are adequate and whether residual or stored energy is present;
- d. Use the materials and procedures specified in their organizations' Energy Control Program and this directive to implement the LOTO program compliance requirements;
- e. When tagging out the energy source, use a standard LOTO tag which can be acquired via store stock. The organization performing the LOTO will be responsible for procuring and using the correct tag and lock;
- f. Develop written equipment specific procedures as defined by section 2.5 of this procedure; and
- g. Evaluate LOTO procedures for equipment they do not specifically service at least annually in accordance with 29 CFR 1910.147(c)(6).

1.4 All Affected Employees should:

Be familiar with their organizations' LOTO Program (if civil servant) or their companies' LOTO program (if contract employees, and to the extent required/provided in their contracts), and:

- a. The purpose and use of LOTO procedures;
- b. How to recognize LOTO procedures when in use;
- c. The importance of not tampering with or removing a lock and/or tag in use as a part of a LOTO procedure; and
- d. Complete and document LOTO awareness training.

1.5 Contracting Officers shall:

To extent required/included in contracts, enforce the contract safety clauses and specifications for noncompliance if records of equivalent training cannot be produced or if LOTO procedures are found to be deficient with respect to this document

1.6 Contracting Officer's Representatives (CORs) shall:

- a. Contact Safety Division office or Directorate Safety Representative for support in reviewing written LOTO programs; and
- b. To the extent required/included in contracts, ensure onsite contractors, and construction contractors in their Divisions are informed of and adhere to the GSFC LOTO policy.

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1.7 Onsite and Construction Contractors to the extent provided in contracts, shall, unless otherwise required:

- a. Submit to COR as part of the contract-required Safety Plan a LOTO program that meets the provisions of this directive; and
- b. Make available to COR upon request training and certification records that meet the requirements of the training section in this document.

1.8 Facilities Management Division (FMD) and Center personnel responsible for procurement of hazardous energy producing equipment shall:

Require the design and procurement of hazardous energy-producing equipment to allow for the acceptance of a primary lockout device when new machinery or equipment is installed, repaired, renovated, or modified.

2. LOTO PROCEDURAL REQUIREMENTS

LOTO-identified activities shall have written LOTO procedures for each LOTO activity unless exclusions apply (see sections 2.1 and 2.5). Typical activities requiring LOTO procedures include, but are not limited to:

- a. Repairing electrical circuits or equipment;
- b. Working on or near equipment with movable parts;
- c. Clearing blocked or jammed mechanisms; and
- d. Working on lines carrying hazardous materials/substances, materials/substances under pressure, or materials/substances involving dangerous temperatures.

Appendix A of 29 CFR 1910.147 provides a sample of a typical “minimum” LOTO procedure.

LOTO procedures shall include:

- a. Scope – A list of the applicable equipment and any limits to the scope of the program;
- b. Purpose – A statement that equipment shall be isolated from hazardous energy or materials/substances, and that the equipment be locked or tagged out before equipment servicing or maintenance is performed;
- c. Authorization – The names of authorized and affected employees, if any, on the tag;
- d. Preparation for lockout or tagout – A list of the isolating devices to be locked or tagged out; and
- e. The procedural steps for locking or tagging out the hazardous energy source; the sequence of the lockout or tagout events.

2.1 Exclusions

LOTO procedures do not apply, to minor tool changes, adjustments or other minor servicing activities that take place during normal production operations if they are routine, repetitive, and

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integral (as defined by OSHA) to the use of the equipment for production, provided that the work is performed using alternative measures that provide effective protection.

Refer to the decision-making flowchart on page 14. Use the flowchart as a tool to guide actions taken during the assessment of a variety of potential LOTO situations.

2.2 Emergency Removal

The LOTO Manager or Supervisor may remove the energy-controlling device when the authorized employee who applied a LOTO device is not available to remove it. This emergency procedure will be performed only under extreme circumstances and in accordance with 29 CFR1910.147 (e) (3) the specific procedure shall include the following elements at a minimum;

1. Verification by the employer that the authorized employee who applied the device is not at the facility;
2. Making all reasonable efforts to contact the authorized employee to inform him/her that his/her lockout or tagout device has been removed; and
3. Ensuring that the authorized employee has this knowledge before he/she resumes work at that facility.

Documentation shall be maintained by the LOTO Manager/Supervisor summarizing the circumstances and rationale in such an event.

2.3 Tagout Only Procedures

Any energy-isolating device capable of being locked out shall be locked out using the LOTO program, without exception.

The use of a “tagout only” procedure shall:

- a. Be permitted only if an energy-controlling source is incapable of being locked out;
 - b. Where possible, include a secondary means of isolating the hazardous energy to provide an equivalent level of safety as if a lockout device was in place. Examples include removal of an isolating circuit element, blocking of a controlling switch, opening of an extra disconnect device, or removal of a valve handle. Secondary means of isolation will be identified on the tag, and tags be affixed to both the primary energy-isolating device at the same location that the lockout device would be attached, and to the mechanism at the secondary point of isolation; and
 - c. Use an equipment-specific LOTO written procedure if it is determined that an energy-supplying source is incapable of being locked out and a second means of isolation is not possible.
- Approval of this procedure must be obtained from the Safety Division prior to implementation.

2.4 Equipment De-Energization (Outage)

All affected employees shall be notified prior to the de-energizing of equipment to be locked and/or tagged out. The person responsible for the outage will contact the Facility Operations Manager (FOM) and the affected employees’ Supervisor, who will then notify the affected persons as to when and where the LOTO procedure will take place, and on what equipment.

2.5 Equipment-Specific Written Procedures

Procedures shall be developed, documented and utilized for the control of potentially hazardous energy when employees are engaged in the activities covered by this document. The authorized employee will ensure a procedure is written to address all LOTO operations that do not meet the exception as stated below.

Exception: The employer need not document the required procedure for a particular machine or equipment, when all of the following elements exist: (1) The machine or equipment has no potential for stored or residual energy or re-accumulation of stored energy after shut down which could endanger employees; (2) the machine or equipment has a single energy source which can be readily identified and isolated; (3) the isolation and locking out of that energy source will completely de-energize and deactivate the machine or equipment; (4) the machine or equipment is isolated from that energy source and locked out during servicing or maintenance; (5) a single lockout device will achieve a locked-out condition; (6) the lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance; (7) the servicing or maintenance does not create hazards for other employees; and (8) the employer, in utilizing this exception, has had no accidents involving the unexpected activation or re-energization of the machine or equipment during servicing or maintenance. Equipment specific procedures shall include a section to release equipment or processes from a locked and tagged out situation in accordance with 29 CFR1910.147(e).

2.6 Requirements for Shift and Personnel Changes

LOTO operations shall ensure the continuity of LOTO protection during shift or personnel changes if work is to be continued by an oncoming shift and orderly transfer of LOTO devices and procedures between authorized employees or supervisors.

Requires that	Shall
Both shifts and/or authorized employees	<ul style="list-style-type: none"> • Be present.
The outgoing shift	<ul style="list-style-type: none"> • Remove its lock and tag after oncoming shift has applied its lock and tag, and give an update of any work changes.
The oncoming shift	<ul style="list-style-type: none"> • Verify a zero energy state still exists. • Place its lock and tag on the group LOTO device, immediately.
An outgoing authorized employee	<ul style="list-style-type: none"> • Remove his or her LOTO device. • Inform the authorized oncoming employee of any potential hazards.
An oncoming authorized employee	<ul style="list-style-type: none"> • Verify a zero energy state still exists. • Place his or her LOTO device immediately after the outgoing authorized employee remove his or her LOTO device.

2.7 Group Lockout Tagout

When servicing and or maintenance is performed by a crew, department, or other group, the Lockout or Tagout procedures used shall:

- a. Give the employees a level of protection equivalent to that provided in a personal Lockout or Tagout procedure;
- b. Incorporate these additional requirements over personal Lockout procedures. The first or lead lock on a group lockout tree or box will be red to adhere to the standardization protocols set forth in this document. It is the first lock on and the last lock off. Other locks on the tree or box can vary in shape, size or color depending on the organization's protocol for LOTO devices;
- c. Assure that an authorized employee is assigned primary responsibility for a set number of employees working under the protection of a group Lockout or Tagout device; and
- d. Assure that the authorized employee be able to determine the exposures of individual group members with regard to the Lockout or Tagout of the machine or equipment.

3. LOTO DEVICE

- a. Lockout locks shall be red in color. Red locks will not be used for any other purpose. Red shrink wrap material can be used to meet this requirement. These LOTO devices will be durable to the environment to which they are exposed. See Figure 1 for examples of red locks and acceptable red shrink wrap material.
- b. Identifiable – Lockout devices and tagout devices shall indicate the identity of the employee applying the device(s). This can be accomplished with a legible tag or legibly written on the lock itself.
- c. Locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware may be provided by the authorized user's organization for the purpose of isolating, securing or blocking of machines or equipment from hazardous energy sources.

3.1 Keys

- a. Each LOTO padlock should have a maximum of two keys, primary and emergency;
- b. The primary key shall remain in the possession of the authorized employee who applied the lock;
- c. The emergency key shall be kept in a secured area (e.g., a lock box) with access limited to the authorized employee's immediate supervisor; and
- d. Emergency keys shall only be used in accordance with Section 2.3 of this procedure.



Figure 1

3.2 Tags

- Tags shall not be used in lieu of a lock unless the energy-isolating device is not physically capable of being locked. In the event a lock cannot be used tagout procedures will comply with 29 CFR1910.147(c)(3) and Section 2.3 of this document;
- Tagout tags shall read “Do Not Operate”;
- Tagout tags shall conform to the durability and securing requirements specified in 29 CFR1910.147(c)(5); and
- The authorized employee who performs LOTO should complete all applicable sections of the tag.

3.3 Record of LOTO Events

Documentation for each LOTO event is required to be recorded in an organizational/department or project log, or the equivalent. The following information should be recorded:

- Name of authorized employee who performed the LOTO process;
- Date and time LOTO was applied;
- Equipment and/or circuit identification;
- Reason for LOTO application;
- Schematic drawing or print numbers, when available;

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- f. Date and time of proposed LOTO removal; and
- g. Name of authorized employee who will remove LOTO if different from authorized employee who initiated the LOTO process.

4. Release from Lockout and/or Tagout

Before the device(s) is/are removed and energy restored, the authorized employee shall:

- a. Inspect the machine/equipment for foreign objects and remove them to bring an operational safety state; and
- b. Ensure other employee(s) are in a safe area away from the machine / equipment when being re-energized after the completion of maintenance or repair, notify affected employee(s) about the LOTO devices been lifted.

Appendix A – Definitions

- A.1 Affected employee** – An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.
- A.2 Authorized employee** – A person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this section.
- A.3 Capable of being locked out** – An energy-isolating device is capable of being locked out if it has a hasp or other means of attachment to which or through which a lock can be affixed, or it has a locking mechanism built into it. Other energy-isolating devices are capable of being locked out if lockout can be achieved without the need to dismantle, rebuild, or replace the energy-isolating device or permanently alter its energy control capability.
- A.4 Energy isolating device** – A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and, in addition, no pole can be operated independently; a line valve; a block; and any similar device used to block or isolate energy. Push buttons, selector switches, and other control circuit-type devices are not energy-isolating devices.
- A.5 Energy source** – Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.
- A.6 Lockout** – The placement of a lockout device on an energy-isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.
- A.7 Lockout device** – A device that utilizes a positive means such as a lock, either key or combination-type, to hold an energy isolating device in a safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds.
- A.8 Normal production operations** – The utilization of a machine or equipment to perform its intended production function.
- A.9 Servicing and/or maintenance** – Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning, or unjamming of machines or equipment, and making adjustments or tool changes, where the employee may be exposed to the unexpected energizing or startup of the equipment or release of hazardous energy.
- A.10 Setting up** – Any work performed to prepare a machine or equipment to perform its normal production operation.
- A.11 Tagout** – The placement of a tagout device on an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

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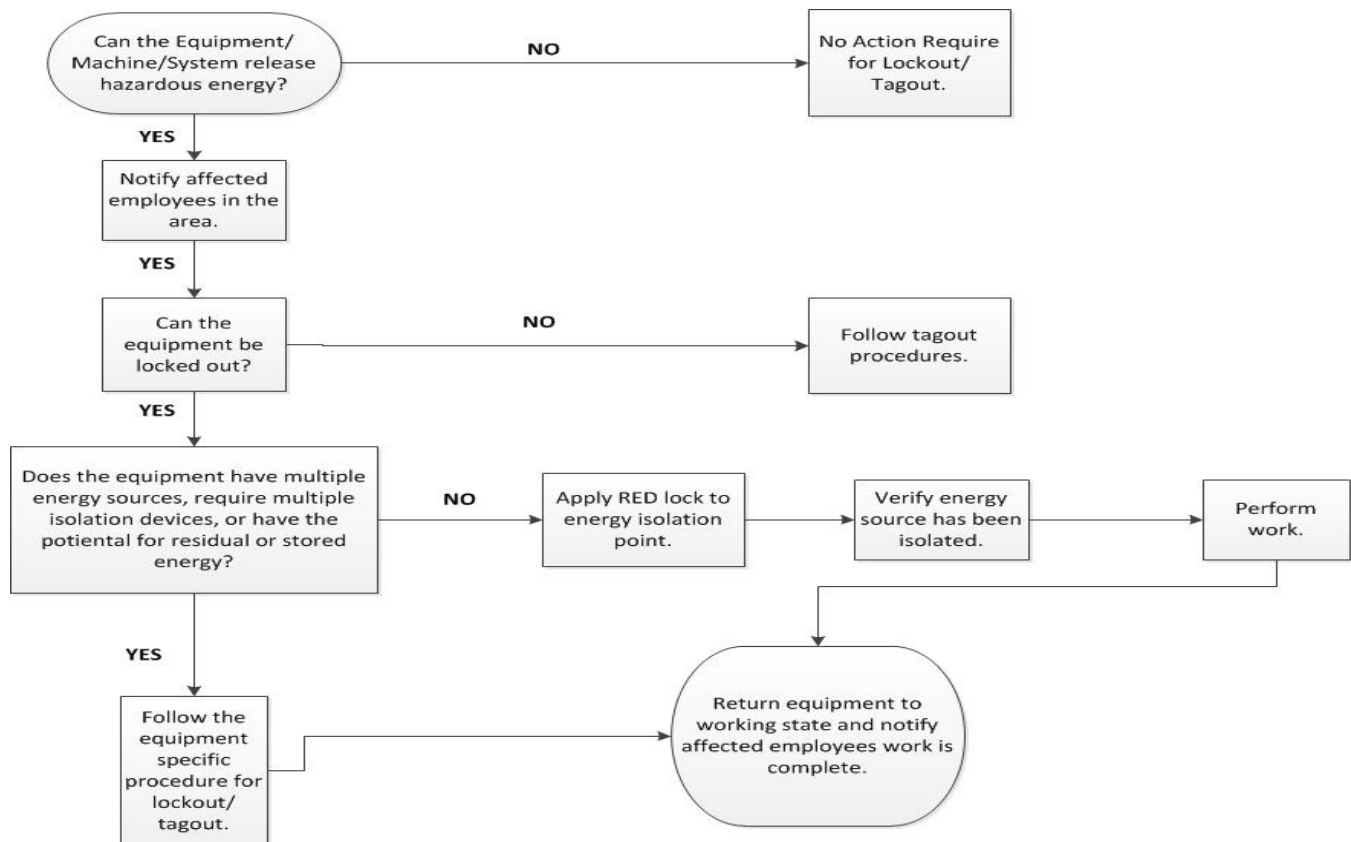
- A.12 Tagout device** – A prominent warning device, such as a tag and a means of attachment, which can be fastened securely to an energy-isolating device in accordance with an established procedure, to indicate that the energy-isolating device and the equipment being controlled may not be operated until the tagout device is removed.

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Appendix B – Acronyms

CFR	Code of Federal Regulations
COR	Contracting Officer's Representatives
CPR	Cardiopulmonary Resuscitation
FAR	Federal Acquisition Regulation
FOM	Facility Operations Manager
GPR	Goddard Procedural Requirement
GSFC	Goddard Space Flight Center
LOTO	Lockout/Tagout
NASA	National Aeronautics and Space Administration
NPR	NASA Procedural Requirement
NRRS	NASA Records Retention Schedules
OJT	On-the-Job Training
OSHA	Occupational Safety and Health Administration

Appendix C - LOTO Process



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CHANGE HISTORY LOG

Revision	Effective Date	Description of Changes
Baseline	06/02/05	Initial Release
A	04/02/10	Administratively Revised to update the Responsible Office Code, Organization Title and organization name within the document. Administratively extended for 1 year from original expiration date.
B	01/13/12	Document has been updated to comply with standardization requirements for LOTO devices across the center.
C	10/26/15	Update to remove administrative locking requirements. Group lockout tagout added. Updated Responsible Office Code and Organization name within the document.